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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/623,440	09/05/2000	Tsuyoshi Takagi	450108-02280	3925

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EXAMINER	
WOZNIAK, JAMES S	

ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 03/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 09/623,440	Applicant(s) TAKAGI ET AL.	
	Examiner James S. Wozniak	Art Unit 2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 10-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 10-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 September 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the office action from 10/4/2004, the applicant has submitted a request for continued examination, filed 10/19/2004, amending Claims 1, 11, and 12, while arguing to traverse the art rejection based on the limitation regarding a transition probability calculated according to transition probability equations utilizing improvement and lowering ratios *(Amendment, Page 8)*. The applicant's arguments have been fully considered but are moot with respect to the new grounds of rejection in view of Taylor et al *(U.S. Patent: 5,175,798)*.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-6, 8, and 10-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiya et al *(U.S. Patent: 6,175,772)* in view of Lund et al *("Adaptive LEGO Robots. A Robot-Human View on Robotics")*, and further in view of Taylor et al *(U.S. Patent: 5,175,798)*.

With respect to **Claim 1**, Kamiya discloses:

A mechanical device, characterized by comprising:

Drive means for performing a behavior *(drive means and display, Col. 10, Lines 44-62)*;

Stimulus detection means for detecting a stimulus *(Col. 4, Lines 6-14)*;

Storage means for storing a behavioral model prescribing a behavior *(storage means for storing user intentions related with emotional models in a model for deciding robot behavior, Col. 7, Lines 33-46)*;

Control means for controlling said drive means based on the behavioral model stored in said storage means *(behavior decision means for controlling robot functions, Col. 8, Lines 51-58)*;

Changing means for changing the behavioral model based on a predetermined stimulus detected by said stimulus detection means *(learning and altering behavior based upon user interaction, Col. 7, Lines 3-25).*

Kamiya does not teach the behavioral model as a probability automaton prescribed by a state corresponding to a behavior and transition probability of the state, however Lund recites:

Behavioral model is a probability automaton prescribed by a state corresponding to a behavior and transition probability of the state *(robot behavior determined by an internal state contained within a behavior set, Page 1021, Behavior Set and Behavior Engine, Fig. 7, and probability based behavior, Behavior Set Selector, Page 1021)*; and

Changing means changes transition probability in the probability automaton based on the detected stimulus *(creation of emergent behaviors based on external stimulus, Page 1021, Behavior Set, Paragraph 2, and probability based behavior, Behavior Set Selector, Page 1021).*

Kamiya and Lund are analogous art because they are from a similar field of endeavor in user interaction with an entertainment robot. Thus, it would have been obvious to a person of

ordinary skill in the art, at the time of invention, to combine the use of probabilistic internal states in determining robot behavior as taught by Lund with the interactive robot capable of detecting user inputs as stimulus to produce, learn, or alter a behavior as taught by Kamiya to allow for more adaptive robot behavior, thus allowing for increased realism in robot interaction and evolving robot behavior *(Lund, Conclusion, Page 1023)*.

Although Kamiya in view of Lund teaches changing probability based behavior transitions, Kamiya in view of Lund do not suggest that a new transition probability is calculated according to transition probability equations, wherein the probability is multiplied by an improvement ratio if a stimulus is evaluated as being good and by a lowering ratio if a stimulus is evaluated as being negative, however Taylor teaches a training algorithm utilizing behavior probability multiplied by a punishment to reward ratio that can be adjusted according to an action success or failure *(Col. 3, Line 42- Col. 4, Line 42)*.

Kamiya, Lund, and Taylor are analogous art because they are from a similar field of endeavor in robot behavior processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Kamiya in view of Lund with the training algorithm utilizing a behavior probability multiplied by a punishment to reward ratio as taught by Taylor in order to provide fast and efficient means for robot behavior reinforcement training through the use of the training algorithm *(Taylor, Col. 3, Lines 28-41)*.

With respect to **Claim 2**, Kamiya further recites:

Stimulus is provided by a user *(sensing means detecting stimulus from a user, Col. 4, Lines 6-14)*.

With respect to **Claim 3**, Kamiya additionally discloses:

Stimulus detection means comprising a pressure sensor detecting pressure provided by the user as stimulus *(Col. 4, Line 8, Fig. 3, Element 4)*; and

Changing means for changing the behavioral model based on a predetermined stimulus detected by the stimulus detection means *(evolving robot behavior based upon a tactile user input, Col. 4, Lines 47-64)*.

With respect to **Claim 4**, Kamiya further recites:

Stimulus detection means comprising a pressure sensor detecting pressure provided by the user as stimulus *(Col. 4, Line 8, Fig. 3, Element 4)*; and

Changing means changes the behavioral model based on a size and length of pressure detected by a pressure sensor *(pressure amount detection, Col. 5, Lines 54-58, tactile duration detection, Col. 5, Lines 38-41. and the generation of emotions for changing robot behavior according to tactile data, Col. 6, Lines 6-10)*.

With respect to **Claim 5**, Kamiya additionally discloses:

Stimulus detection means comprises a microphone collecting voice provided by the user as the stimulus *(Col. 4, Lines 36-38, and Fig. 3, Element 8)*; and

Changing means changes the behavioral model based on the voice collected by the microphone *(evolving robot behavior based upon an audio user input from a microphone, Col. 4, Lines 47-64)*.

With respect to **Claim 6**, Kamiya further recites:

Stimulus detection means further comprises a speech recognition means *(voice detection unit that analyzes a voice input from the microphone using speech recognition means, Col. 5, Lines 59-65)*; and

Changing means changes the behavioral model based on a speech recognition result of the voice by the speech recognition means *(evolving robot behavior based upon a voice input from a microphone, Col. 4, Lines 47-64).*

With respect to **Claim 8,** Kamiya further recites:

Stimulus detection means further comprises a prosody information detection means detecting prosody information about the voice *(detecting the tone of a voice input to determine user emotion, Col. 4, Lines 10-12)*; and

Changing means changes the behavioral model according to the prosody information detected by the prosody information detection means *(evolving robot behavior based upon user emotion data contained in a voice input from a microphone, Col. 4, Lines 47-64).*

With respect to **Claim 10**, Kamiya teaches the interactive robot capable of detecting user voice and tactile inputs as stimulus to produce, learn, or alter a behavior as applied to Claim 1. Kamiya does not teach a time lapse as a stimulus for returning to an original state of operation, however Lund suggests:

Changing means restores the behavioral model to an original state depending on a time lapse after changing the behavioral model (necessity for sleep behavior returned to from an awakened state after a duration of time within a 24 hour cycle, Page 1022, State Variables, Paragraph 2).

Kamiya, Lund, and Taylor are analogous art because they are from a similar field of endeavor in robot behavior processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Kamiya and Taylor with the time duration in prescribing a robot behavior as taught by Lund to allow for increased robot

realism through the performance of various behaviors at specific durations in time *(Lund, Conclusion, Page 1023)*.

With respect to **Claim 11**, Kamiya discloses:

Control step and for controlling drive means to perform a behavior based on a behavioral model prescribing a behavior *(behavior decision means for controlling robot functions, Col. 8, Lines 51-58);*

Stimulus detecting step of detecting a stimulus *(Col. 4, Lines 6-14)*; and

A changing step of changing the behavioral model based on a detected predetermined stimulus *(learning and altering behavior based upon user interaction, Col. 7, Lines 3-25)*.

Kamiya does not teach the behavioral model as a probability automaton prescribed by a state corresponding to a behavior and transition probability of the state, however Lund recites:

Behavioral model is a probability automaton prescribed by a state corresponding to a behavior and transition probability of the state *(robot behavior determined by an internal state contained within a behavior set, Page 1021, Behavior Set and Behavior Engine, Fig. 7, and Behavior Set Selector, Page 1021)*; and

Changing means changes transition probability in the probability automaton based on the detected stimulus *(creation of emergent behaviors based on external stimulus, Page 1021, Behavior Set, Paragraph 2, and Behavior Set Selector, Page 1021)*.

Kamiya and Lund are analogous art because they are from a similar field of endeavor in user interaction with an entertainment robot. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the use of probabilistic internal states in determining robot behavior as taught by Lund with the interactive robot control method

for detecting user inputs as stimulus to produce, learn, or alter a behavior as taught by Kamiya to allow for more adaptive robot behavior, thus allowing for increased realism in robot interaction and evolving robot behavior *(Lund, Conclusion, Page 1023)*.

Although Kamiya in view of Lund teaches changing probability based behavior transitions, Kamiya in view of Lund do not suggest that a new transition probability is calculated according to transition probability equations, wherein the probability is multiplied by an improvement ratio if a stimulus is evaluated as being good and by a lowering ratio if a stimulus is evaluated as being negative, however Taylor teaches a training algorithm utilizing behavior probability multiplied by a punishment to reward ratio that can be adjusted according to an action success or failure *(Col. 3, Line 42- Col. 4, Line 42)*.

Kamiya, Lund, and Taylor are analogous art because they are from a similar field of endeavor in robot behavior processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Kamiya in view of Lund with the training algorithm utilizing a behavior probability multiplied by a punishment to reward ratio as taught by Taylor in order to provide fast and efficient means for robot behavior reinforcement training through the use of the training algorithm *(Taylor, Col. 3, Lines 28-41)*.

With respect to **Claim 12**, Kamiya in view of Lund, and further in view of Taylor teaches the interactive robot capable of detecting user voice and tactile inputs as stimulus to produce, learn, or alter a behavior as applied to Claim 11 and program command that controls robot operation *(Col. 2, Line 17)*. Neither Kamiya, Lund, nor Taylor specifically teaches the use of a recording medium containing such a program, however, the examiner takes official notice that it would have been obvious to one of ordinary skill in the art at the time of invention, to implement

the robot operating program on a CD-ROM or other such recording medium for the purpose of pre-preprogramming a robot or allowing a robot to follow a pre-set sequence of behavior by inserting a recording medium containing a program into the robot device.

4. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiya et al in view of Lund et al, further in view of Taylor et al and yet further in view of Wang et al *(U.S. Patent: 6,646,541)*.

With respect to **Claim 7**, Kamiya in view of Lund, and further in view of Taylor teaches the interactive robot capable of recognizing user voice input as stimulus to produce, learn, or alter a behavior as applied to Claim 6 Kamiya in view of Lund, and further in view of Taylor does not teach the use of a dictionary in speech recognition of a user input, however Wang teaches a user created dictionary that is utilized in recognizing a robot control speech command *(lexicon, Col. 6, Lines 16-65)*.

Kamiya, Lund, Taylor, and Wang are analogous art because they are from a similar field of endeavor in robot behavior processing. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to combine the use of a dictionary in speech recognition as taught by Wang with the interactive robot capable of recognizing user voice input as stimulus to produce, learn, or alter a behavior as taught by Kamiya in view of Lund, and further in view of Taylor to provide a means, well known to one of ordinary skill in the art, at the time of invention, of storing recognized speech commands taught by Kamiya in a dictionary for more efficient and user configurable speech recognition in robot interaction.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Mitchell et al *("Neural Network Controller for Mobile Robot Insect," 1994)*- teaches robot success and failure algorithms used in device training.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (703) 305-8669 and email is James.Wozniak@uspto.gov. The examiner can normally be reached on Mondays-Fridays, 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached at (703) 305-4827. The fax/phone number for the Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center receptionist whose telephone number is (703) 306-0377.

James S. Wozniak
3/3/2005

David L. Ometz
Primary Examiner